£40m micro & nano technology capital projects requested

In July, Science and Innovation Minister Lord Sainsbury announced a cash injection of £90m over the next six years to help industry harness the commercial opportunities offered by nanotechnology.

The call for capital projects proposals was opened on 7 October. In the context of the UK MNT Network, capital projects are defined as projects which implement "industry /market facing UK based facilities which provide cost-effective open access for organisations and individuals to capabilities, processes and associated knowledge leading to marketable products, and services."

Successful applications are likely to include the delivery of one or more of the following elements:

core platform manufacturing technologies for MNT (such as silicon, compound semiconductor, glass, polymer etc.) to enable the development of marketable products;

and/or an environment with sufficient flexibility to enable the development of novel manufacturing technologies to enable the development of marketable products;

and/or provide an environment for the provision of design, diagnostic and analytical services, including measurement and characterisation.

The first call closes midday on 2nd December 2003.

More information at: http://www.microandnanotech.info

Toughest interconnects and packaging

George Harman, a world authority on materials for microelectronic interconnections and packaging at the National Institute of Standards and Technology (NIST), recently made a workshop presentation for National Aeronautics and Space Administration (NASA) engineers at the Jet Propulsion Laboratory on designing semiconductor device interconnections to withstand extreme space environments.

Harman recommended that spacebound microelectronics interconnections be made with corrosion resistant, highly stable metals, especially gold. He also suggested the use of some newer polymers that can withstand extreme temperatures, but are not yet used in the space program.

"Flip chips" are another interconnection approach, that, with proper metallurgy, may make sense in high-temperature planetary environments. Instead of using wire leads around the edges of a microchip to export electrical signals, flip chips normally use a pattern of ball-shaped solder contacts that are attached directly on the chip surface.

Harman suggested that NASA consider using flip chips designed with gold contacts to produce spacecraft electronics that are both space-saving and heat resistant.

Contact: inquiries@nist.gov

SiGe tunnelling diode development

A team of engineers from Ohio State, the Naval Research Laboratory, and the University of California, Riverside, have designed a new tunnelling diode which conducts 150,000 amps/cm2 of its SiGe based material, a rate three times higher than that of the only comparable silicon tunnel diode.

Initially the researchers tried to develop intraband diodes with silicon. Faced with a "materials science nightmare," they turned to constructing an Esaka style interband diode, layering Si and SiGe into a structure, and discovered by changing the thickness of a central "spacer" layer, where the electrons are tunneling, they could tailor the current that passed through the material, tempered with a design that kept the boron and phosphorus from intermixing.

The diode's ability to operate in low-power conditions makes it ideal for use in devices that generate radio-frequency signals, such as cordless telephones and cell phones. Despite little power input, the diode could generate a strong signal.

Among prospective applications are medical devices where diode could support a low-power data link allowing diagnostics on pacemakers and other implants by remote

The work was sponsored by the National Science Foundation, the Office of Naval Research and a major electronics company working to develop wireless applications for the technology. Depending on the initial development, the technology could reach the consumer market in somewhere between five and fifteen years.

Technology: Microelectronics

The Dutch solar car Nuna II, using ESA space technology, finished first in the World Solar Challenge, a 3010km race right across Australia for cars powered by solar energy. Travelling from Darwin to Adelaide, in a new record-breaking time of 30 hours 54 minutes, Nuna II beat the previous record of 32 hours 39 minutes set by its Dutch precursor Nuna in 2001. The average speed of what the Australian press dubbed 'The Flying Dutchman' was 97kph with a top speed of 110 kph finally setting a new world record.

The car's shell is covered with the best triple junction gallium-arsenide solar cells, developed for satellites. These collect up to 20% more energy than those used in the 2001 race and are being used in the SMART-1 Moon mission.

Nuna II also carries Maximum Power Point Trackers, small devices that guarantee an optimal balance between power from the battery and the solar cells, even in less favourable situations like shade and cloud.

Nuna II has been built by a team of 12 students from the universities of Delft and Rotterdam. ESA not only provided them with engineering support via its Technology Transfer Programme but also with general support via the Education Office, previously headed by former ESA astronaut Wubbo Ockels, who is also adviser to the team.

Technology: Microelectronics

Among CONNECT MIP 2003 Awards finalists was Palomar Technologies, picked for its Model 6500 Precision Eutectic Die Bonder, the automated assembly machine that precisely picks, places, and attaches electronic and photonic components and assembles to complex devices such as telecom source lasers, RF-MEMS switches, and high performance consumer products.

This is the preferred method for dies that are thin, brittle (such as RF devices or MEMS), or intolerant of high heat, because application of ultrasonic energy may reduce the need for heat and force. This interconnect method is an alternative to solder reflow and improves thermal and electrical conductivity. The process is used with gold stud bumping for flip chip applications.

Can a virus be used to build a transistor? [Even better can it work with III-V compounds?] Apparently Dr Angela Belcher is researching this in her MIT laboratory in Cambridge, Mass. She is forcing evolution to genetically engineer and reproduce viruses that can adhere to semiconductors. The combination of virus and semiconductor, plus DNA to act as the blueprint, will then engage in biological self-assembly to produce nanoelectronic components. Well, if five diverse groups of bacteria work using photosynthesis and if bacteria and algae can communicate, a livewire transistor seems entirely feasible.

Harris Corporation reports Q1 2004 showed net income at $26m (39c/diluted share) compared with the prior year quarter of $19.9m (30c/diluted share), up 31% and revenue up 24%, at $559.2m versus the $450.2m previous comparable period.

SiGen goes nano and fabless

Silicon Genesis Corporation, founded in 1997 and a developer of Silicon-On-Insulator (SOI) and engineered wafer technologies, is to move towards the role of a fabless company, focusing efforts primarily on licensing its nano-technology processes.

"This allows the company to provide the necessary customer service support without reservation. Under our previous strategy, we were competing directly with our licensees," says Lori Nye, senior director of marketing and sales.

The SiGen NanoTec licenses include: NanoCleave - for thin film lamination and layer transfer developed for SOI wafer, but applicable to Germanium-on-Insulator and multiplayer stacked SOI wafers; NanoSmooth - achieving wafer surfaces under 1 Angstrom roughness; NanoBond - plama activated bonding enabling up to 30 times conventional wet bonding strengths and NanoStrain - silicon enabling developments like GeOI.

"We have completed the development of our IP and process technologies, including proving this technology with product and process validation from multiple device and wafer makers," says Francois Henley, founder and CEO of SiGen.

"Our focus for the future is to license and enable others to make products using our technology, while protecting and strengthening our IP with the use of a smaller R&D facility. SiGen owns or controls all of its licensable technology and has over 65 issued patents worldwide, with more pending.

"In the last few months we have experienced significant traction in concluding multiple commercial licenses. The timing is right for this transition," Henley said.

Raytheon gets radar business

Raytheon Company has been awarded a $36.9m contract for production of its ALR-67(V)3 radar warning receiver system for the U.S. Navy. This is the radar warning receiver on U.S. Navy F/A-18E/F carrier-based tactical aircraft that recently completed a successful initial deployment in Operation Iraqi Freedom.

The production award represents the fifth full rate production lot awarded to Raytheon. Low rate initial production of the system began in June 1998, followed by full rate production in August 1999. The current award was received from the US Navy's Naval Air Systems Command and calls for the delivery of 30 radar warning receivers. Deliveries of the system will begin in February 2005 and are expected to be complete by September.

The system, designated the AN/ALR-67(V)3, provides advanced techniques to detect and identify threat radar emitters, thereby enhancing the survivability of aircraft equipped with the system.

A total of 209 radar warning receivers plus spares has now been ordered under the overall production program. Work on the radar warning receiver is being done by the company's Electronic Warfare Systems organization in Goleta, California with support provided by other US facilities.

The ALR-67(V)3 includes emitter identification, extended capabilities in detection and processing, threat location and potential lethality. Raytheon has packaged the channelised the radar warning receiver into a lightweight 100lb system.

Anadigics acquires Tavanza handset & amplifiers

Anadigics has acquired Celeritek subsidiary Tavenza, the wireless handset power amplifier business, to broaden its CDMA line and accelerate its penetration into strategic handset OEM customers.

The agreement includes 3mm x 3mm x 1mm CDMA power amplifiers, technology, and IP as well as key RF engineering personnel. Celeritek announced exiting handset & power amplifiers in September to focus on GaAs-based subsystems and semis for defence.

Andadigics has reported net sales of $17.8m, a 41c/share loss for Q3 ended September '03, compared to revenues of $18m Q2 of '03. Wireless revenue in the quarter was $9.5m, an increase of 5.6% over the prior quarter. CDMA PA revenues accounted for 82% of wireless revenue. Unit shipments in wireless were up 31%, CDMA power amplifier (PA) unit shipments up 13% over the prior quarter. Broadband revenues of $8.3m dropped 8.4%, reflecting seasonal patterns and continued industry softness.